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Employment

Columbia University, New York, NY
2024 – *Roderick H. Cushman Associate Professor of Business*
2023 – 2024 *Associate Professor of Business*
2019 – 2023 *Assistant Professor of Business*

2018 – 2019 **Google Research**, Cambridge, MA
Postdoctoral Researcher, Operations Research Team

2015 **Jane Street Capital**, New York, NY
Trader Intern

2013 – 2015 **Lunarch Studios Inc.**, Waterloo, ON Canada
Co-founder

I took leave from MIT in 2013 to form the start-up Lunarch Studios, which launched the strategy game *Prismata* on the *Steam* platform.

Education

2015 – 2018 **Massachusetts Institute of Technology**, Cambridge, MA
2010 – 2012 *Ph.D. in Operations Research*
Advisor: David Simchi-Levi

2006 – 2010 **University of Waterloo**, Waterloo, ON Canada
B.Math with honors in Pure Mathematics and Combinatorics/Optimization

Journal Papers

1. **Degeneracy is OK: Logarithmic Regret for Network Revenue Management with Indiscrete Distributions** with Jiashuo Jiang, Jiawei Zhang
Operations Research, forthcoming
2. **The Benefits of Delay to Online Decision-Making** with Yaqi Xie, Linwei Xin
Management Science, forthcoming
*covered in Chicago Booth Review, 2023
*selected for presentation in the MSOM Supply Chain Management SIG, 2023

3. **Tightness without Counterexamples: A New Approach and New Results for Prophet Inequalities** with Jiashuo Jiang, Jiawei Zhang
Mathematics of Operations Research, forthcoming
4. **Improved Guarantees for Offline Stochastic Matching via new Ordered Contention Resolution Schemes** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan
Mathematics of Operations Research, articles in advance
5. **Leveraging the degree of Dynamic Substitution in Assortment and Inventory Planning** with Jingwei Zhang, Huseyin Topaloglu
Operations Research (Technical Note), articles in advance
6. **On (Random-order) Online Contention Resolution Schemes for the Matching Polytope of (Bipartite) Graphs** with Calum MacRury, Nathaniel Grammel
Operations Research, articles in advance
7. **Tight Guarantees for Multi-unit Prophet Inequalities and Online Stochastic Knapsack** with Jiashuo Jiang, Jiawei Zhang
Operations Research, articles in advance
*Jiashuo Jiang was a Finalist in the George E. Nicholson Student Paper Competition, 2022
*Jiashuo Jiang was a Finalist for the Jeff McGill Student Paper Award for Revenue Management and Pricing, 2021
8. **Online Matching Frameworks under Stochastic Rewards, Product Ranking, and Unknown Patience** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan
Operations Research, articles in advance
9. **Order Selection Problems in Hiring Pipelines** with Boris Epstein
Operations Research, 2024
10. **Optimizing for Strategy Diversity in the Design of Video Games** with Oussama Hanguir, Jiangze Han, Christopher Thomas Ryan
Mathematical Programming, 2024
11. **Assortment Planning for Recommendations at Checkout under Inventory Constraints** with Xi Chen, David Simchi-Levi, Linwei Xin
Mathematics of Operations Research, 2024
*1st Place, Chinese Scholars Association for Management Science and Engineering (CSAMSE) Best Paper Award sponsored by Columbia Business School, 2017
*covered in Chicago Booth Review, 2018
12. **Tight Guarantees for Static Threshold Policies in the Prophet Secretary Problem** with Nick Arnosti
Operations Research, 2023
13. **Order-optimal Correlated Rounding for Fulfilling Multi-item E-commerce Orders**
Manufacturing & Service Operations Management, 2023
*accepted for presentation at Applied and Computational Discrete Algorithms (ACDA), 2023
*invited for presentation in Online Algorithms & Online Rounding workshop at FOCS 2023
*selected for presentation in the MSOM Supply Chain Management SIG, 2022

14. **When is Assortment Optimization Optimal?**

Management Science, 2023

*2nd Place, Rothkopf Junior Researcher Paper Prize for Auctions and Market Design, 2021

*selected for spotlight presentation in the INFORMS Revenue Management and Pricing Conference, 2022

*selected for presentation in the MSOM Service SIG, 2021

15. **Fairness Maximization among Offline Agents in Online-Matching Markets** with Pan Xu, Yifan Xu

ACM Transactions on Economics and Computation (TEAC), 2023

16. **Revenue-Optimal Deterministic Auctions for Multiple Buyers with Ordinal Preferences over Fixed-Price Items**

ACM Transactions on Economics and Computation (TEAC) (invited submission), 2022

17. **Bifurcating Constraints to Improve Approximation Ratios for Network Revenue Management with Reusable Resources** with Jackie Baek

Operations Research (Technical Note), 2022

18. **Distributionally Robust Linear and Discrete Optimization with Marginals** with Louis Chen, Karthik Natarajan, David Simchi-Levi, Zhenzhen Yan

Operations Research, 2022

19. **Inventory Balancing with Online Learning** with Wang Chi Cheung, David Simchi-Levi, Xinshang Wang

Management Science, 2022

20. **Dynamic Pricing (and Assortment) under a Static Calendar** with David Simchi-Levi, Jinglong Zhao

Management Science, 2021

21. **On Policies for Single-leg Revenue Management with Limited Demand Information** with David Simchi-Levi, Chung-Piaw Teo

Operations Research, 2021

22. **Algorithms for Online Matching, Assortment, and Pricing with Tight Weight-dependent Competitive Ratios** with David Simchi-Levi

Operations Research, 2020

*Finalist, George E. Nicholson Student Paper Competition, 2017

23. **Separation between Second Price Auctions with Personalized Reserves and the Revenue Optimal Auction** with Balasubramanian Sivan

Operations Research Letters, 2020

24. **Strong Mixed-Integer Programming Formulations for Trained Neural Networks** with Ross Anderson, Joey Huchette, Christian Tjandraatmadja, Juan Pablo Vielma

Mathematical Programming, 2020

25. **Improvements and Generalizations of Stochastic Knapsack and Markovian Bandits Approximation Algorithms**
Mathematics of Operations Research, 2018
 *2nd place, INFORMS Optimization Society Student Paper Competition, 2017
26. **Packing and Covering Triangles in Planar Graphs** with Qing Cui, Penny Haxell
Graphs and Combinatorics, 2009

Working Papers

1. **Beyond IID: Data-Driven Decision-Making in Heterogeneous Environments** with Omar Besbes, Omar Mouchtaki
 Minor Revision in *Management Science*
2. **From Contextual Data to Newsvendor Decisions: On the Actual Performance of Data-Driven Algorithms** with Omar Besbes, Omar Mouchtaki
 Major Revision in *Management Science*
3. **Real-Time Personalized Order Holding** with Mohammad Reza Aminian, Linwei Xin
 R & R in *Management Science*
 *covered in Chicago Booth Review, 2024
4. **Online Contention Resolution Schemes for Network Revenue Management and Combinatorial Auctions** with Calum MacRury, Jingwei Zhang
5. **Dynamic Pricing for Reusable Resources: The Power of Two Prices** with Santiago Balseiro, Wenxin Zhang
 Major Revision in *Operations Research*
6. **Online Bipartite Matching with Advice: Tight Robustness-Consistency Tradeoffs for the Two-Stage Model** with Billy Jin
 R & R in *Management Science*
 *Billy Jin was Winner of Student Paper Prize of INFORMS Decision Analysis Society, 2023
7. **Survey of Data-driven Newsvendor: Unified Analysis and Spectrum of Achievable Regrets** with Zhuoxin Chen
8. **VC Theory for Inventory Policies** with Yaqi Xie, Linwei Xin
 *selected for presentation in the MSOM Supply Chain Management SIG, 2024
9. **Online Matching and Contention Resolution for Edge Arrivals with Vanishing Probabilities** with Calum MacRury, Pranav Nuti
10. **A Nonparametric Framework for Online Stochastic Matching with Correlated Arrivals** with Ali Aouad
 Major Revision in *Management Science*
11. **Optimizing Inventory Placement for a Downstream Online Matching Problem** with Boris Epstein
 Major Revision in *Manufacturing & Service Operations Management*
 *Boris Epstein was a Finalist in the George E. Nicholson Student Paper Competition, 2024

12. **Random-order Contention Resolution via Continuous Induction: Tightness for Bipartite Matching under Vertex Arrivals** with Calum MacRury
13. **The Competitive Ratio of Threshold Policies for Online Unit-density Knapsack Problems** with David Simchi-Levi, Jinglong Zhao
Minor Revision in *Management Science*
*Jinglong Zhao earned an Honorable Mention in the POMS-HK Student Paper Competition, 2020
14. **Multi-Stage and Multi-Customer Assortment Optimization With Inventory Constraints** with Elaheh Fata, David Simchi-Levi

Conference Papers

1. **Sample Complexity of Posted Pricing for a Single Item** with Billy Jin, Thomas Kesselheim, Sahil Singla
Neural Information Processing Systems (NeurIPS), 2024 (Spotlight)
2. **Fair Secretaries with Unfair Predictions** with Eric Balkanski, Andreas Maggiori
Neural Information Processing Systems (NeurIPS), 2024
3. **Promoting Fairness Among Dynamic Agents in Online-Matching Markets under Known Stationary Arrival Distributions** with Pan Xu
Neural Information Processing Systems (NeurIPS), 2024
4. **Online Matching and Contention Resolution for Edge Arrivals with Vanishing Probabilities** with Calum MacRury, Pranav Nuti
Economics and Computation (EC), 2024
5. **Random-order Contention Resolution via Continuous Induction: Tightness for Bipartite Matching under Vertex Arrivals** with Calum MacRury
Symposium on Theory of Computing (STOC), 2024
6. **Tightness without Counterexamples: A New Approach and New Results for Prophet Inequalities** with Jiashuo Jiang, Jiawei Zhang
Economics and Computation (EC), 2023
7. **A Nonparametric Framework for Online Stochastic Matching with Correlated Arrivals** with Ali Aouad
Economics and Computation (EC), 2023
8. **Order-optimal Correlated Rounding for Fulfilling Multi-item E-commerce Orders**
Economics and Computation (EC), 2023
9. **Optimizing for Strategy Diversity in the Design of Video Games** with Oussama Hanguir, Christopher Thomas Ryan
Integer Programming and Combinatorial Optimization (IPCO), 2023
10. **On (Random-order) Online Contention Resolution Schemes for the Matching Polytope of (Bipartite) Graphs** with Calum MacRury, Nathaniel Grammel
Symposium on Discrete Algorithms (SODA), 2023

11. **Order Selection Problems in Hiring Pipelines** with Boris Epstein
Web and Internet Economics (WINE), 2022
12. **Constructing Demand Curves from a Single Observation of Bundle Sales** with David Simchi-Levi
Web and Internet Economics (WINE), 2022
13. **Beyond IID: Data-Driven Decision-Making in Heterogeneous Environments** with Omar Besbes, Omar Mouchtaki
Neural Information Processing Systems (NeurIPS), 2022
14. **Online Bipartite Matching with Advice: Tight Robustness-Consistency Tradeoffs for the Two-Stage Model** with Billy Jin
Neural Information Processing Systems (NeurIPS), 2022
15. **Tight Guarantees for Static Threshold Policies in the Prophet Secretary Problem** with Nick Arnosti
Economics and Computation (EC), 2022
16. **When is Assortment Optimization Optimal?**
Economics and Computation (EC), 2022
17. **Group-level Fairness Maximization in Online Bipartite Matching** with Pan Xu, Yifan Xu
Autonomous Agents and Multi-Agent Systems (AAMAS), 2022
18. **Tight Guarantees for Multi-unit Prophet Inequalities and Online Stochastic Knapsack** with Jiashuo Jiang, Jiawei Zhang
Symposium on Discrete Algorithms (SODA), 2022
19. **Fairness Maximization among Offline Agents in Online-Matching Markets** with Pan Xu, Yifan Xu
Web and Internet Economics (WINE), 2021
20. **Improved Guarantees for Offline Stochastic Matching via new Ordered Contention Resolution Schemes** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan
Neural Information Processing Systems (NeurIPS), 2021
21. **Follow Your Star: New Frameworks for Online Stochastic Matching with Known and Unknown Patience** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan
Artificial Intelligence and Statistics (AISTATS), 2021
22. **Reaping the Benefits of Bundling under High Production Costs** with David Simchi-Levi
Artificial Intelligence and Statistics (AISTATS), 2021
23. **Revenue-Optimal Deterministic Auctions for Multiple Buyers with Ordinal Preferences over Fixed-Price Items**
Web and Internet Economics (WINE), 2020
24. **The Convex Relaxation Barrier, Revisited: Tightened Single-Neuron Relaxations for Neural Network Verification** with Christian Tjandraatmadja, Ross Anderson, Joey Huchette, Krunal Patel, Juan Pablo Vielma
Neural Information Processing Systems (NeurIPS), 2020

25. **Distributionally Robust Max Flows** with Louis Chen, Jim Orlin, David Simchi-Levi
Symposium on Simplicity in Algorithms (SOSA), 2020
26. **Tight Weight-dependent Competitive Ratios for Online Edge-weighted Bipartite Matching and Beyond** with David Simchi-Levi
Economics and Computation (EC), 2019
27. **Improvements and Generalizations of Stochastic Knapsack and Markovian Bandits Approximation Algorithms**
Symposium on Discrete Algorithms (SODA), 2014
28. **A Geometric Approach to Combinatorial Fixed-point Theorems** with Elyot Grant
European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB), 2013
29. **The Approximability and Integrality Gap of Interval Stabbing and Independence Problems** with Shalev Ben-David, Elyot Grant, Malcolm Sharpe
Canadian Conference on Computational Geometry (CCCG), 2012

Book Chapters

1. **Randomized Rounding Approaches to Online Allocation, Sequencing, and Matching**
INFORMS Tutorials, 2024

Cases

1. **Temu: Slow and Cheap Wins the Race**
Columbia CaseWorks, forthcoming
2. **Ventilator Rationing during the Covid-19 Pandemic**
Columbia CaseWorks, 2020
*Finalist, Informis Case Competition, 2020

Grants

Columbia-Dream Sports AI Innovation Center, “**Dynamic State Dependent Catalog Optimization Approach for Contest Generation**”, joint with Vineet Goyal
Amount: \$122,502

Columbia Center of AI Technology (CAIT) in collaboration with *Amazon*, “**Joint Selection and Inventory Optimization under Limited Capacity**”, joint with Huseyin Topaloglu
Amount: \$150,000; Duration: January 2022–June 2023

Teaching

Columbia:

2025 Spring	B9136 Analysis of Algorithms in Operations Research (PhD)
2024 Fall-A	B8109 Supply Chain Management (MBA)
2024 Summer-block	B8109 Revenue and Supply Chain Management (MBA)
2024 Spring	B8109 Supply Chain Management (MBA)
2023 Spring	B9136 Topics in Revenue and Supply Chain Management (PhD)
2023 Spring	B8109 Supply Chain Management (MBA)
2022 Spring	B8108 Supply Chain Management (MBA)
2021 Spring	B9136 Topics in Revenue and Supply Chain Management (PhD)
2021 Spring	B8108 Supply Chain Management (MBA)
2020 Spring	B8108 Supply Chain Management (MBA)

MIT:

2017 Spring	15.762/15.763 Supply Chain Management, co-instructor
2016 Winter	15.S50 Special Seminar in Management
2013 Winter	15.S50 Special Seminar in Management
2012 Winter	15.S50 Special Seminar in Management

Special Seminar in Management: This is a course I designed based on my experience as a former professional poker player. It consists of eight 90-minute lectures and two problem sets, which grant a 1/4-credit at MIT. I use the game of poker to illustrate concepts in probability and statistics, and more generally, as a framework within which to think about difficult decisions, uncertainty, risk, and a good outcome vs. a good decision. This has now become a yearly course at MIT, and has been placed onto MIT OpenCourseWare. Furthermore, I have been invited to give the introductory lecture from this course, “The Joy of Making Good Decisions”, at various venues, including *Google New York*, *Riot Games*, the *MIT Entrepreneurship Center*, and the *MIT Master of Finance* program.

Academic Mentorship

Current students: Boris Epstein (Columbia DRO Ph.D. expected 2025), Wenxin Zhang (Columbia DRO Ph.D. expected 2026; co-advised with Santiago Balseiro), Yaqi Xie (Chicago Booth Ph.D. expected 2027; co-advised with Linwei Xin), Matias Romero (Columbia DRO Ph.D. expected 2027; co-advised with Hongyao Ma)

Former students: Omar Mouchtaki (Columbia DRO Ph.D. 2024; co-advised with Omar Besbes), Jiashuo Jiang (NYU Stern Ph.D. 2022; co-advised with Jiawei Zhang)

Other student collaborators: Billy Jin (Cornell ORIE), Nathaniel Grammel (Maryland CS), Mohammad Aminian (Chicago Booth), Pranav Nuti (Stanford Math)

Current postdocs: Calum MacRury, Andreas Maggiori (co-mentored with Eric Balkanski)

Former postdocs: Jingwei Zhang (co-mentored with Huseyin Topaloglu)

Thesis committee member: Hao-Ting Wei (Columbia IEOR Ph.D. 2024), Shawn Xia (Columbia DRO Ph.D. 2024), Harsh Sheth (Columbia IEOR Ph.D. 2023), Noemie Perivier (Columbia IEOR Ph.D. 2023), Judy Gan (Columbia DRO Ph.D. 2023), Oussama Hanguir (Columbia IEOR Ph.D. 2022), Xingyu Zhang (Columbia IEOR Ph.D. 2021)

Other Professional Activities

Associate Editor for journals: Operations Research, Management Science

Reviewer for journals: Operations Research, Management Science, Mathematics of Operations Research, Manufacturing & Service Operations Management, Mathematical Programming, Transportation Science, INFORMS Journal on Computing, Production and Operations Management, Naval Research Logistics, Journal of the Operational Research Society, SIAM Journal on Computing, SIAM Journal on Discrete Mathematics, Algorithmica, ACM Transactions on Economics and Computation

Program Committee for conferences: EC 2025 (senior), EC 2024 (senior), WINE 2023 (senior), EC 2023, WINE 2022, EC 2022, WINE 2021, EC 2021

Reviewer for conferences: ICALP 2024, STOC 2024, SODA 2024, NeurIPS 2023, ESA 2023, STOC 2023, IPCO 2023, ITCS 2022, NeurIPS 2022, ESA 2022, SODA 2021, SODA 2020, SODA 2018

Co-organizer of conferences: Revenue Management & Pricing (RMP) 2025, NYC Ops Day 2024, NYC Ops Day 2023, RMP cluster at INFORMS 2022

Co-organizer of IEOR-DRO seminar series at Columbia, 2021 –

Organizer of DSL seminar series at MIT, 2016 – 2018

Visiting Scholar, hosted by Prof. Chung-Piaw Teo of the Department of Analytics & Operations in NUS Business School, January 2017

Co-supervisor (with David Simchi-Levi) of Arjun Khandelwal through the MIT Undergraduate Research Opportunities Program (UROP), working on “Predicting User Choice in Video Games”

Invited Talks

2024 Rice Business School, Operations Management seminar
 Duke Fuqua, Decision Sciences seminar
 CMU Tepper, Operations Research seminar
 Baruch, Operations Management seminar
 University of Science and Technology of China, Digital Intelligence Supply Chain seminar
 Rutgers CS Theory lunch
 INFORMS tutorial on Randomized Rounding
 Banff workshop on New Directions in Machine Learning Theory
 TTIC workshop on Data-Driven Decision Processes: From Theory to Practice
 Tsinghua SEM, Management Science and Engineering seminar
 CUHK, DOT-SEEM seminar
 HKUST, joint IE/OM seminar
 HKU, seminar jointly hosted by Business School's IIM and Department of Computer Science
 Shanghai University of Finance and Economics, ITCS seminar
 CUHK-Shenzhen, School of Data Science colloquium series
 University of Tokyo, seminar for research group of Yasushi Kawase
 Stanford University, RAIN (Research on Algorithms and Incentives in Networks) seminar
 Banff workshop on Combinatorial Optimization for Online Platforms
 Simons Institute reunion workshop for Data-driven Decision Processes program

- 2023 Online Algorithms & Online Rounding workshop at FOCS
Cornell ORIE seminar series
Cornell Johnson, OTIM seminar
- 2022 Columbia DRO Brown Bag seminar
Tiger Analytics academic seminar
Simons Institute weekly seminar for Data-driven Decision Processes program
Berkeley IEOR weekly seminar
3rd Workshop on Information and Learning, IESE Barcelona
MIT Operations Research seminar series
UIUC ISE weekly seminar
- 2021 University of Maryland, Theory CS group CATS seminar
HKUST Business School, ISOM seminar
2nd Workshop on Information and Learning, virtual
NYU Stern, Operations Management seminar
Stanford Business School, OIT seminar
- 2020 CBS PFS No Free Lunch seminar
UMD Smith
USC Marshall
- 2019 NJIT Tuchman
Cornell Tech
DSL seminar, MIT
1st Workshop on Information and Learning, IESE Barcelona
Core Data Science, Facebook Research
Algorithms Seminar, Google Research NYC
- 2018 Duke Fuqua, Operations Management
Columbia IEOR-DRO seminar
Harvard Kennedy School, Quantitative Analysis
WUSTL Olin, Operations and Manufacturing Management
Georgia Tech ISyE
CMU Tepper, Operations Research
UW Foster, Operations Management
UCLA Anderson, Decisions, Operations, and Technology Management
Chicago Booth, Operations Management
- 2017 UVA Darden, Quantitative Analysis
INSEAD, Technology and Operations Management
Northwestern Kellogg, Operations Management
Dartmouth Tuck, Operations and Management Science
MIT Sloan, Operations Management seminar
Stanford Market Innovation Workshop
Princeton ORFE
NYU Stern, Operations Management seminar
NUS Business School, Analytics & Operations seminar
SUTD Engineering Systems and Design seminar
- 2016 Cornell ORIE Ph.D. Student Workshop

Outside Activities

Columbia Business School requires faculty members to disclose any activities that might present a real or apparent conflict of interest. I currently have no outside activities fitting this description.